

Work Order ID: 122841

July-29-14 2:01:38 PM

\*122841\*

Page 1

Item ID: D212-664-201TRN

Accept

\*N900040100\*

Setup Start \*NS1\*

Revision ID:

Stop \*NS2\*

Item Name: Crosstube Turning Detail

Start Date: 7/29/14 Start Qty: 1.00

\*1\*

Cust Item ID:

Required Date: 8/15/14 Req'd Qty: 1.00

\*1\*

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start \*NR1\*

QC:

Date:

SPC (Y/N):

Date:

Stop \*NR2\*

| Sequence ID/<br>Work Center ID | Operation<br>Description | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

Draw Nbr

Revision Nbr

D212-664-241

Rev

100

0.00

\*100\*

Mori Seiki

Mori Seiki CNC Lathe Large

MORI SEIKI CNC LATHE LARGE

Memo

0.00

1-Fill tube with sand &amp; install plugs DT8534 on both ends as per Folio FA114

2-Turn first side as per Folio FA114

3-Blend transition lines only, \*\*do not sand whole tube\*\*:

FOLIO REV: AD

DWG REV: D

\*Use mill bastard file, brush file repeatedly with file card.

\*Do not use sandpaper coarser than 320 grit.

110

QC1- Inspect dimensions to dimension sheet

0.00

\*110\*

QC

Quality Control

Memo

0.00

MML  
14/08/04

**Work Order ID 122841**

July-29-14 2:01:38 PM

**\*122841\***

Page 2

Item ID: D212-664-201TRN

Accept

**\*N900040100\***Setup Start **\*NS1\***

Revision ID:

Stop **\*NS2\***

Item Name: Crosstube Turning Detail

Start Date: 7/29/14 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 8/15/14 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

| Sequence ID/<br>Work Center ID | Operation<br>Description | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

120

0.00

**\*120\***

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Turn second side as per Folio FA114

2-Blend transition lines only, \*\*do not sand whole tube\*\*:

\*Use mill bastard file, brush file repeatedly with file card.

\*Do not use sandpaper coarser than 320 grit.

FOLIO REV: ADDWG REV: D

3-Remove sand and plugs

4- scribe batch # and part # as per dwg

1 / ~~Ø~~ \_\_\_\_\_  
MML  
14/08/04

130

QC1- Inspect dimensions to dimension sheet

0.00

**\*130\***

QC

Memo

0.00

Quality Control

1 / ~~Ø~~ \_\_\_\_\_  
MML  
14/08/05



# Work Order ID 122841

**\*122841\***

Page 4

July-29-14 2:01:38 PM

Item ID: D212-664-201TRN

Accept

**\*N900040100\***

Setup Start **\*NS1\***

Revision ID:

Item Name: Crosstube Turning Detail

Stop **\*NS2\***

Start Date: 7/29/14 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 8/15/14 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

| Sequence ID/<br>Work Center ID | Operation<br>Description                                 | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp    |
|--------------------------------|--|----------------------|---------|--------|--------------|---------------|---------------|------------------|-------------------|
| 160                            | QC5- Inspect part completeness to step on W/O            | 0.00                 |         |        |              |               |               | 16<br>9-89       | DAS<br>38<br>9-89 |
| <b>*160*</b>                   |  |                      |         |        |              |               |               |                  |                   |
| QC                             | Memo   | 0.00                 |         |        |              | 1             |               | 14/08/21         | 14-8-20           |
| Quality Control                |  |                      |         |        |              |               |               |                  |                   |
| 170                            | Packaging  | 0.00                 |         |        |              |               |               |                  |                   |
| <b>*170*</b>                   |  |                      |         |        |              |               |               |                  |                   |
| Packaging                      | Memo   | 0.00                 |         |        |              |               |               |                  |                   |
| Packaging                      | Identify and stock in kanban rack<br>Location: <u>LG</u> |                      |         |        |              |               |               |                  |                   |
| 180                            | QC21- Final Inspection - Work Order Release              | 0.00                 |         |        |              |               |               |                  |                   |
| <b>*180*</b>                   |  |                      |         |        |              |               |               |                  |                   |
| QC                             | Memo   | 0.00                 |         |        |              |               |               |                  |                   |
| Quality Control                |  |                      |         |        |              |               |               |                  |                   |

JW 14-08-21

MLJ 14-08-22

MF  
14-8-20

# Picklist Print

July-29-14 2:01:37 PM

Page 1

Work Order ID: 122841

**\*122841\***

Parent Item: D212-664-201TRN

**\*D212-664-201TRN\***

Parent Item Name: Crosstube Turning Detail

Start Date: 7/29/14

Required Date: 8/15/14

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A 08-03-06 new issue DD verified by:ec  
IPP Rev B 08.04.02 Removed polish EC verified DD

| Component Item ID/<br>Item Name | Replacement<br>Item ID | Mfg/<br>Purch | Bin<br>Item | Primary<br>Location | Last<br>Location | Route<br>Seq ID | Unit of<br>Measure | Qty on<br>Hand | Qty per Kit | Total<br>Qty | Qty<br>Issued | Date<br>Issued | Status |
|---------------------------------|------------------------|---------------|-------------|---------------------|------------------|-----------------|--------------------|----------------|-------------|--------------|---------------|----------------|--------|
| D6006-129                       |                        | Manufactured  | No          |                     |                  | 120             | Each               | 29.0000        | 1           | 1            |               |                |        |

**\*D6006-129\***

Crosstube Material

**\*\***

| <u>Location</u> | <u>Loc Qty</u> | <u>Loc Code</u> |
|-----------------|----------------|-----------------|
| LG003           | 29             |                 |
| 103426          | 10             |                 |
| 107875          | 18             |                 |
| 75644           | 1              |                 |

\_\_\_\_\_ *mm L 14/07/31*  
\_\_\_\_\_  
\_\_\_\_\_

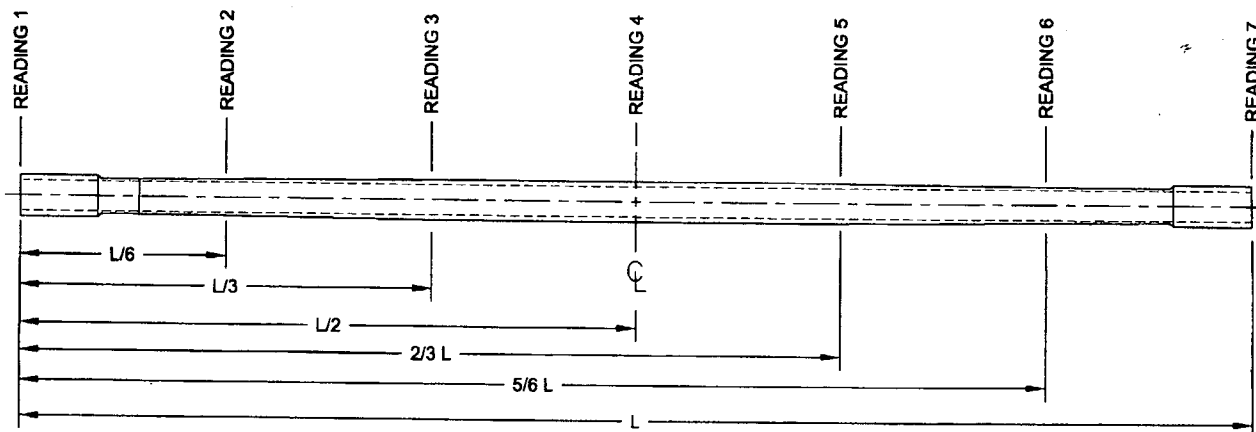
|   |                     |              |
|---|---------------------|--------------|
| <b>DART AEROSPACE LTD</b>                                 | <b>Work Order:</b>  | 122841       |
| <b>Description:</b> Crosstube Assembly (205/212 High Aft) | <b>Part Number:</b> | D212-664-241 |
| <b>Inspection Dwg:</b> D212-664-241 <b>Rev:</b> DE        |                     | Page 1 of 2  |

### FIRST ARTICLE INSPECTION CHECKLIST

| Inspection Sheet<br>Drawing Dimension |         | Tolerance     | Actual<br>Dimension | Accept | Reject | Method of<br>Inspection | Comments |
|---------------------------------------|---------|---------------|---------------------|--------|--------|-------------------------|----------|
| SIDE A                                | 0.200   | +/-0.010      | .200                | /      |        | vern                    | CNC-08   |
|                                       | R0.063  | +/-0.010      | .063                | /      |        | RG                      |          |
|                                       | 2.990   | +0.005/-0.000 | 2.993               | /      |        | vern                    | CNC-08   |
|                                       | 5.237   | +/-0.030      | 5.248               | /      |        |                         |          |
|                                       | 2.600   | +0.005/-0.000 | 2.604               | /      |        |                         |          |
|                                       | 2.686   | +0.005/-0.000 | 2.690               | /      |        |                         |          |
|                                       | 2.770   | +0.005/-0.000 | 2.774               | /      |        |                         |          |
|                                       | 2.854   | +0.005/-0.000 | 2.859               | /      |        |                         |          |
|                                       | 2.938   | +0.005/-0.000 | 2.941               | /      |        |                         |          |
|                                       | 3.021   | +0.005/-0.000 | 3.024               | /      |        | micr                    | CNC-08   |
|                                       | 3.133   | +0.005/-0.000 | 3.136               | /      |        |                         |          |
|                                       | 3.179   | +0.005/-0.000 | 3.184               | /      |        |                         |          |
|                                       |         |               |                     |        |        |                         |          |
| SIDE B                                | 0.200   | +/-0.010      | .200                | /      |        | vern                    | CNC-06   |
|                                       | R0.063  | +/-0.010      | .063                | /      |        | RG                      |          |
|                                       | 2.990   | +0.005/-0.000 | 2.990               | /      |        | vern                    | CNC-08   |
|                                       | 5.237   | +/-0.030      | 5.240               | /      |        |                         |          |
|                                       | 2.600   | +0.005/-0.000 | 2.604               | /      |        |                         |          |
|                                       | 2.686   | +0.005/-0.000 | 2.690               | /      |        |                         |          |
|                                       | 2.770   | +0.005/-0.000 | 2.774               | /      |        |                         |          |
|                                       | 2.854   | +0.005/-0.000 | 2.858               | /      |        |                         |          |
|                                       | 2.938   | +0.005/-0.000 | 2.941               | /      |        |                         |          |
|                                       | 3.021   | +0.005/-0.000 | 3.025               | /      |        | micr                    | CNC-08   |
|                                       | 3.133   | +0.005/-0.000 | 3.138               | /      |        |                         |          |
|                                       | 3.179   | +0.005/-0.000 | 3.184               | /      |        |                         |          |
|                                       | 124.362 | +/-0.020      | 124.360             | /      |        | tape                    | LG-11    |
|                                       |         |               |                     |        |        |                         |          |
|                                       |         |               |                     |        |        |                         |          |

|   |  |                                  |
|---|--|----------------------------------|
| <b>DART AEROSPACE LTD</b>                                 |  | <b>Work Order:</b> 122841        |
| <b>Description:</b> Crosstube Assembly (205/212 High Aft) |  | <b>Part Number:</b> D212-664-241 |
| <b>Inspection Dwg:</b> D212-664-241 <b>Rev:</b> DE        |  | <b>Page 2 of 2</b>               |

### WALL THICKNESS MEASUREMENT



| Location                | WALL THICKNESS MEASUREMENT (IN) |      |      |      | Deviation<br>$\Delta w$<br>(max-min) | TOLERANCE |
|-------------------------|---------------------------------|------|------|------|--------------------------------------|-----------|
|                         | w1                              | w2   | w3   | w4   |                                      |           |
| READING 1<br>L= 0"      | .406                            | .411 | .402 | .393 | -.018                                | 0.062"    |
| READING 2<br>L= 20.5    | .312                            | .341 | .334 | .307 | .034                                 |           |
| READING 3<br>L= 41.5    | .494                            | .484 | .497 | .504 | .020                                 |           |
| READING 4<br>L= 62      | .527                            | .529 | .531 | .538 | .011                                 |           |
| READING 5<br>L= 82.5    | .494                            | .488 | .502 | .514 | -.026                                |           |
| READING 6<br>L= 103.5   | .336                            | .304 | .314 | .350 | .046                                 |           |
| READING 7<br>L= 124.362 | .404                            | .416 | .417 | .407 | .013                                 |           |

#### Calibration Result

Actual Block Thickness: 100 .750

Sitestcan 250 Measured Thickness: 100 .750

|                                 |                              |                              |
|---------------------------------|------------------------------|------------------------------|
| <b>Measured by:</b> <i>mm.l</i> | <b>Audited by:</b> <i>JW</i> | <b>Preliminary Approval:</b> |
| <b>Date:</b> 14/08/05           | <b>Date:</b> 14-08-06        | <b>Date:</b>                 |

| Rev | Date     | Change                           | Revised by | Approved  |
|-----|----------|----------------------------------|------------|-----------|
| A   | 05.04.27 | New Issue (P/O D412-664-201)     | KJ/JLM     |           |
| B   | 06.03.09 | Tolerance for 5.237 was +/-0.001 | KJ/JLM     |           |
| C   | 07.05.08 | Dwg Rev. updated                 | KJ/JLM     |           |
| D   | 10.08.03 | Dimension 124.362 was 124.36     | KJ         |           |
| E   | 12.06.04 | Wall thickness form added        | KJ         | <i>AA</i> |

| Item | Qty<br>-241 | Qty<br>-241B | Part Number     | Description                           |
|------|-------------|--------------|-----------------|---------------------------------------|
| 1    | X           |              | D212-664-241    | CROSSTUBE ASSEMBLY (205/212 HIGH AFT) |
| 2    |             | X            | D212-664-241B   | CROSSTUBE ASSEMBLY (214 HIGH AFT)     |
| 3    | 1           | 1            | D6006-129       | CROSSTUBE                             |
| 4    | 2           |              | D2940-1         | SUPPORT                               |
| 5    | 4           | 4            | D3595-063-530   | RUBBER CUSHION                        |
| 6    |             | 2            | D5018-1         | SUPPORT                               |
| 7    | 4           | 4            | MS21920-28      | CLAMP (OR MS21920-30)                 |
| 8    | A/R         | A/R          | PROSEAL 890 B-2 | SEALANT, AMS-S-8802 CLASS B-2         |

#### GENERAL NOTES:

- MATERIAL: MANUFACTURED FROM D6006-129  
FINISHED LENGTH = 124.362±0.020
- FINISH: a) CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
b) PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
c) MASK UNDERSIDE OF CROSSTUBE AS SHOWN (ZN C6-2 / C6-3, HATCHED AREA)  
d) PAINT OUTSIDE PER DART QSI 005 4.2  
e) REMOVE MASKING AND APPLY MATTE CLEAR COAT
- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART PART NUMBER 'D212-664-XXX' AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- WEIGHT: D212-664-241/-241B = 44.2 lbs
- PART IS SYMMETRIC ABOUT CENTERLINE.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.

#### MACHINING

- RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.

#### BENDING

- BEND PROGRESSIVELY WITH A MINIMUM OF 5 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 7.2% (BASED ON O.D.) IN LOWER HALF OF R35.5 BEND AND 6% (BASED ON O.D.) ON REMAINING TUBE.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.

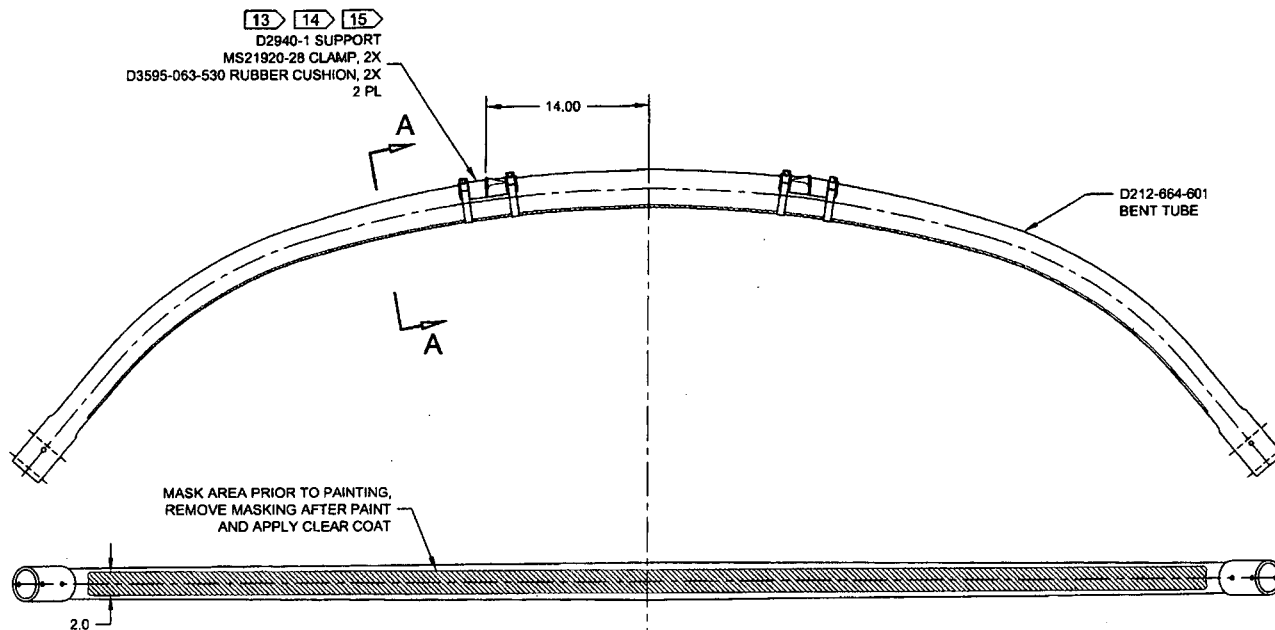
#### ASSEMBLY

- INSTALL D2940-1 / D5018-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- INSTALL MS21920-28 CLAMPS (OR -30) WITH D3595-063-530 RUBBER CUSHIONS TO SECURE THE SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE ON TOP SIDE OF CROSSTUBE.
- TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.

|            |   |  |              |
|------------|---|--|--------------|
| E          | D5018-1 WAS D2940-1 (-241B), PROSEAL WAS MAGNOBOND, NOTE 2: ADD INSPECTION WINDOW, NOTE 11: ALLOW 7.2% CRUSH, NOTE 15: ADD 72HR CURE AND RETORQUE FOR PROSEAL, ADD SHEET 3, CLAMPS REVERSED TO PREVENT CHAFING (ZN B7-2, B7-3), BEND HEIGHT TOL. NOW 0.25 WAS 0.13 (C1-4), INCORP DEO D-1/-2    | CP   | 14.04.01     |
| D          | REFORMAT/REVISE GENERAL NOTES/PART LIST, REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; ADD -241B (ZN D4-2, B4-2); REMOVED REF & ADD TOLERANCES (ZN D8-3 & C4-3, C6-3 & A8-3); RELOCATED FLAG #6 PER PAR 08-046 (ZN A5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4 | RF   | 09.09.30     |
| C          | REMOVE -1008 ABRASION STRIP; ADD MAGNOBOND 6398, CUSHION, REVERSE CLAMPS  | PH   | 07.03.08     |
| B          | ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES   | PH   | 05.02.04     |
| A          | NEW ISSUE   | CP   | 00.12.12     |
| REV.       | DESCRIPTION   | BY   | DATE         |
| DESIGN     | 9   | DART AEROSPACE LTD   |              |
| DRAWN      | 9   | HAWKESBURY, ONTARIO, CANADA  |              |
| CHECKED    | DW  | DRAWING NO.  | REV. E       |
| MFG. APPR. | 214   | D212-664-241   | SHEET 1 OF 5 |
| APPROVED   | 214   | TITLE  | SCALE        |
| DE APPR.   | 214   | CROSSTUBE ASS'Y (205/212 HI AFT)   | NTS          |
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2014-05-26



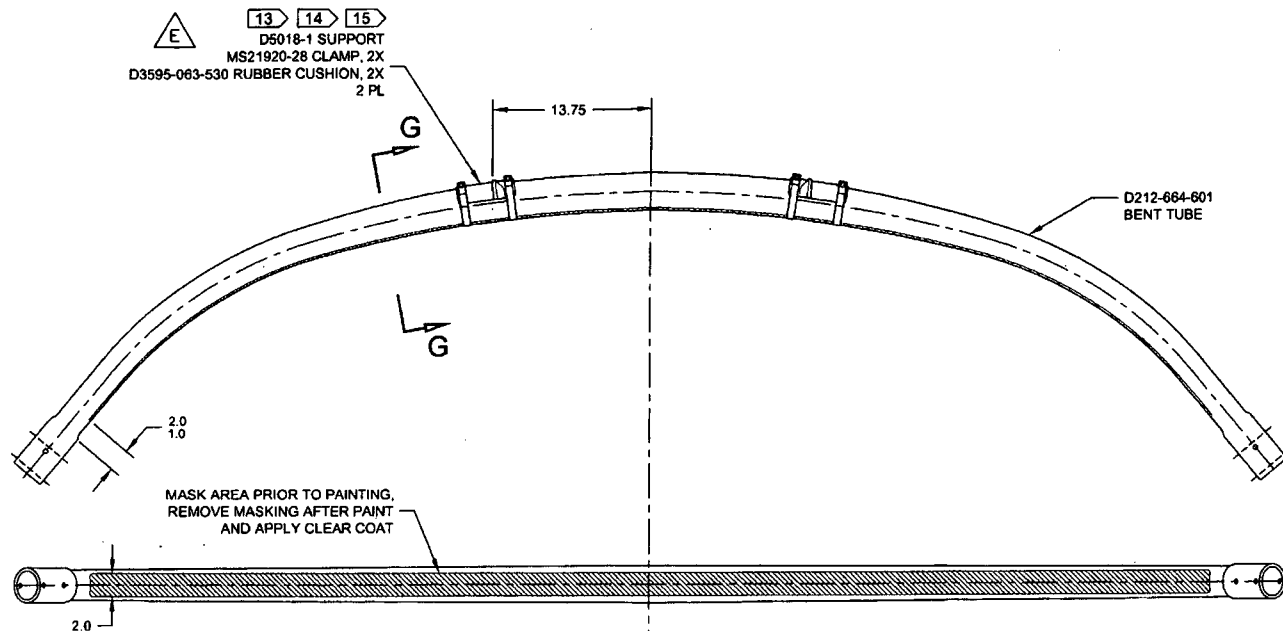


**D212-664-241  
ASSEMBLY DETAIL**

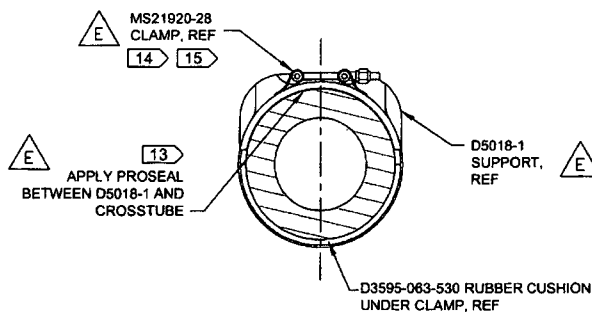
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**SECTION A-A  
SCALE 4X**

|            |          |  |              |
|------------|----------|--|--------------|
| DESIGN     | Q        | <b>DART AEROSPACE LTD</b>  |              |
| DRAWN      | Q        | HAWKESBURY, ONTARIO, CANADA  |              |
| CHECKED    | SW       | DRAWING NO.  | REV. E       |
| MFG. APPR. | SW       | D212-664-241   | SHEET 2 OF 5 |
| APPROVED   | SW       | TITLE  | SCALE        |
| DE APPR.   | H        | CROSSTUBE ASS'Y (205/212 HI AFT)   | NTS          |
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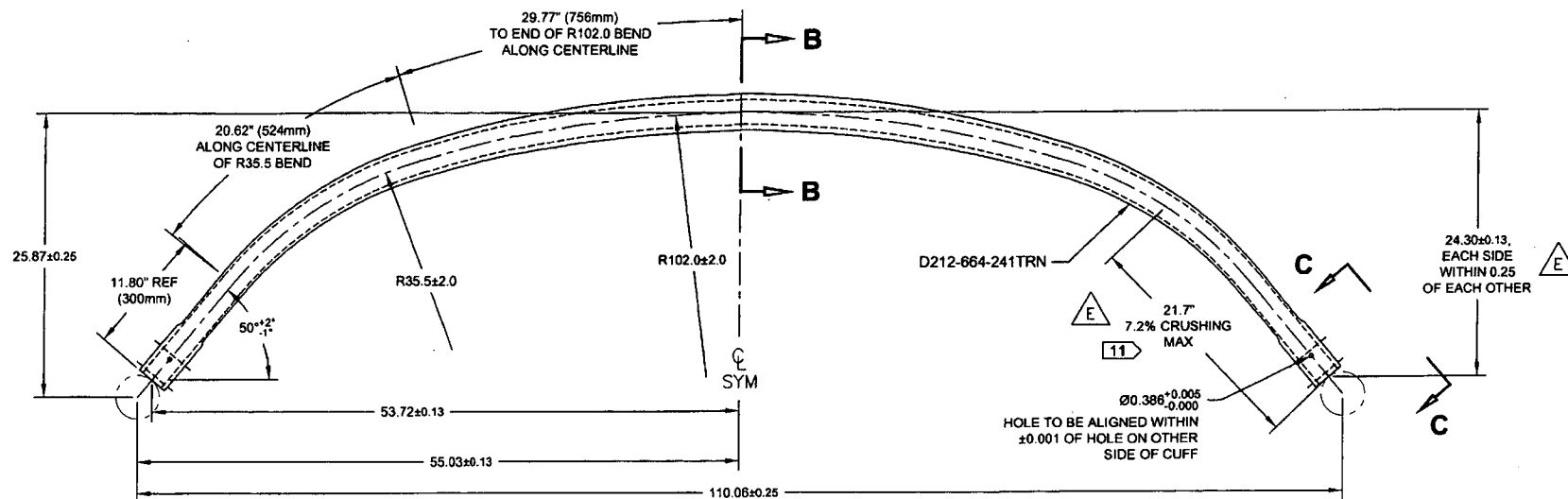
**D212-664-241B**  
**ASSEMBLY DETAIL**



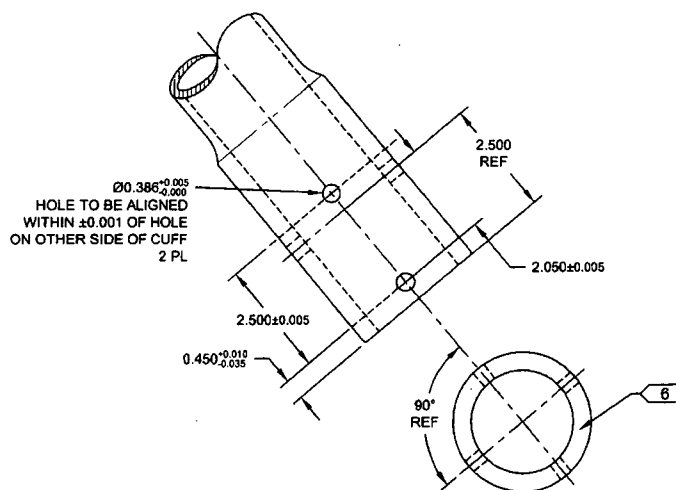
**SECTION G-G**  
**SCALE 4X**

**RELEASED**  
2014-05-26

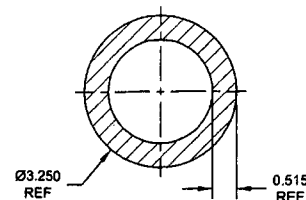
|            |          |  |              |
|------------|----------|--|--------------|
| DESIGN     | 90       | <b>DART AEROSPACE LTD</b>  |              |
| DRAWN      | 90       | HAWKESBURY, ONTARIO, CANADA  |              |
| CHECKED    | DW       | DRAWING NO.  | REV. E       |
| MFG. APPR. | SP       | D212-664-241   | SHEET 3 OF 5 |
| APPROVED   | SP       | TITLE  | SCALE        |
| DE APPR.   | SP       | CROSSTUBE ASS'Y (205/212 HI AFT)   | NTS          |
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**D212-664-601** 11  
**BENDING AND DRILLING DETAIL**



**VIEW C-C: CUFF DETAIL**  
 SCALE 3X



**SECTION B-B**  
 SCALE 4X

**RELEASED**  
 2014-05-26  
 JMD

|            |          |   |              |
|------------|----------|---|--------------|
| DESIGN     | qp       | <b>DART AEROSPACE LTD</b>   |              |
| DRAWN      | qp       | HAWKESBURY, ONTARIO, CANADA   |              |
| CHECKED    | DW       | DRAWING NO.   | REV. E       |
| MFG. APPR. | AW       | D212-664-241  | SHEET 4 OF 5 |
| APPROVED   | AW       | TITLE   | SCALE        |
| DE APPR.   | AW       | CROSSTUBE ASS'Y (205/212 HI AFT)  | NTS          |
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